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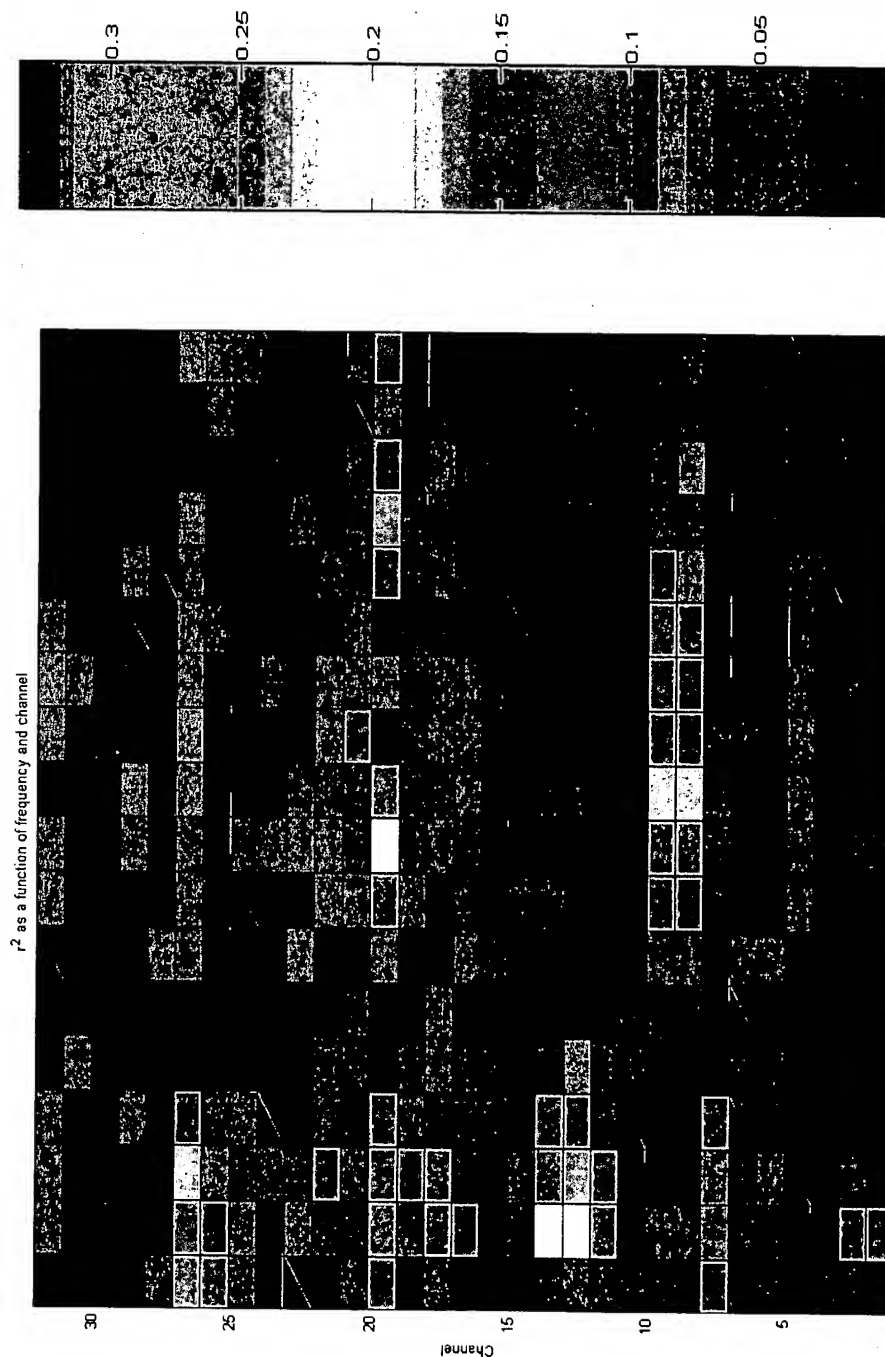
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Figure 1



EEG

ECOG

Figure 2: BCI schematic

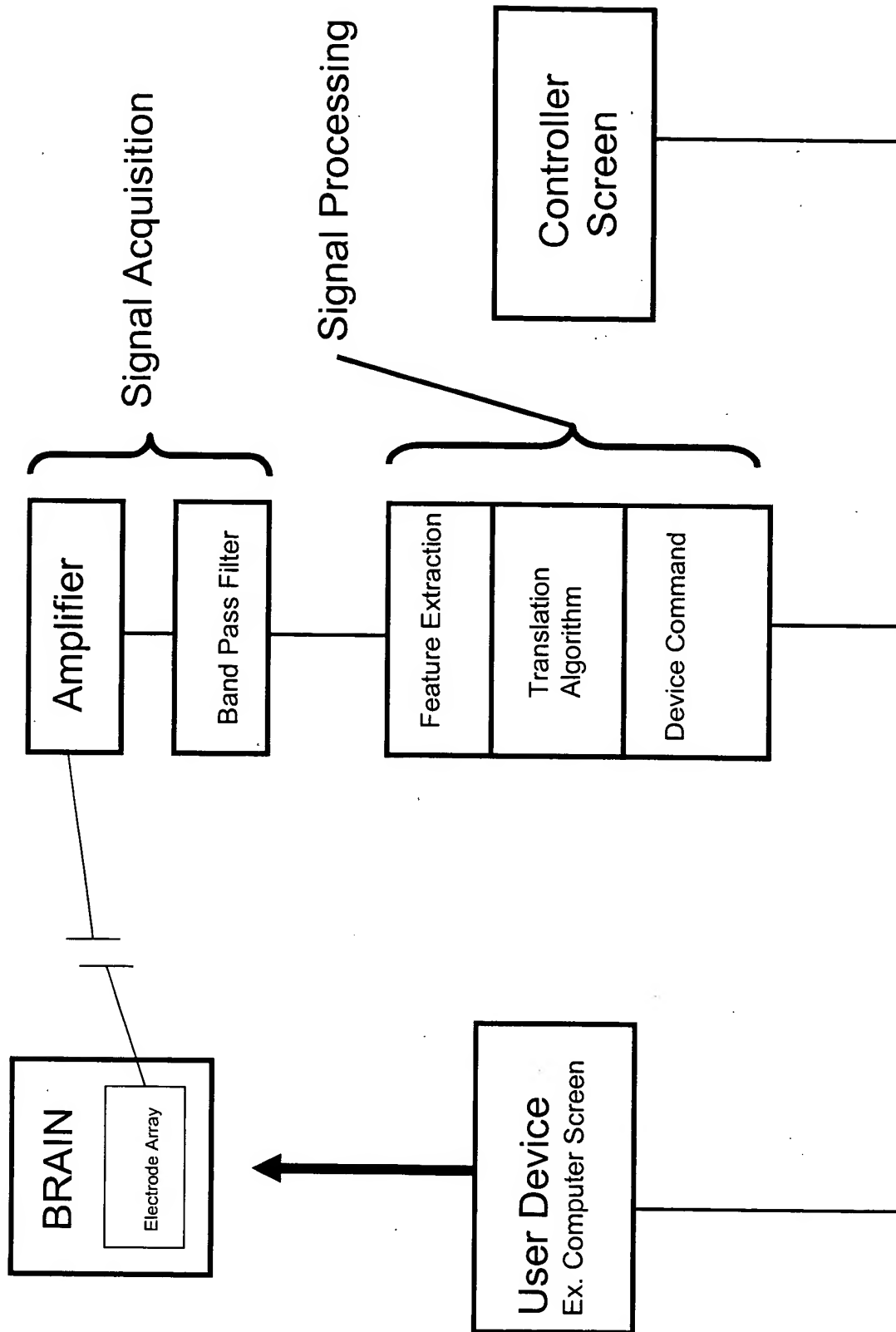


Figure 3a. Ecog BCI - System

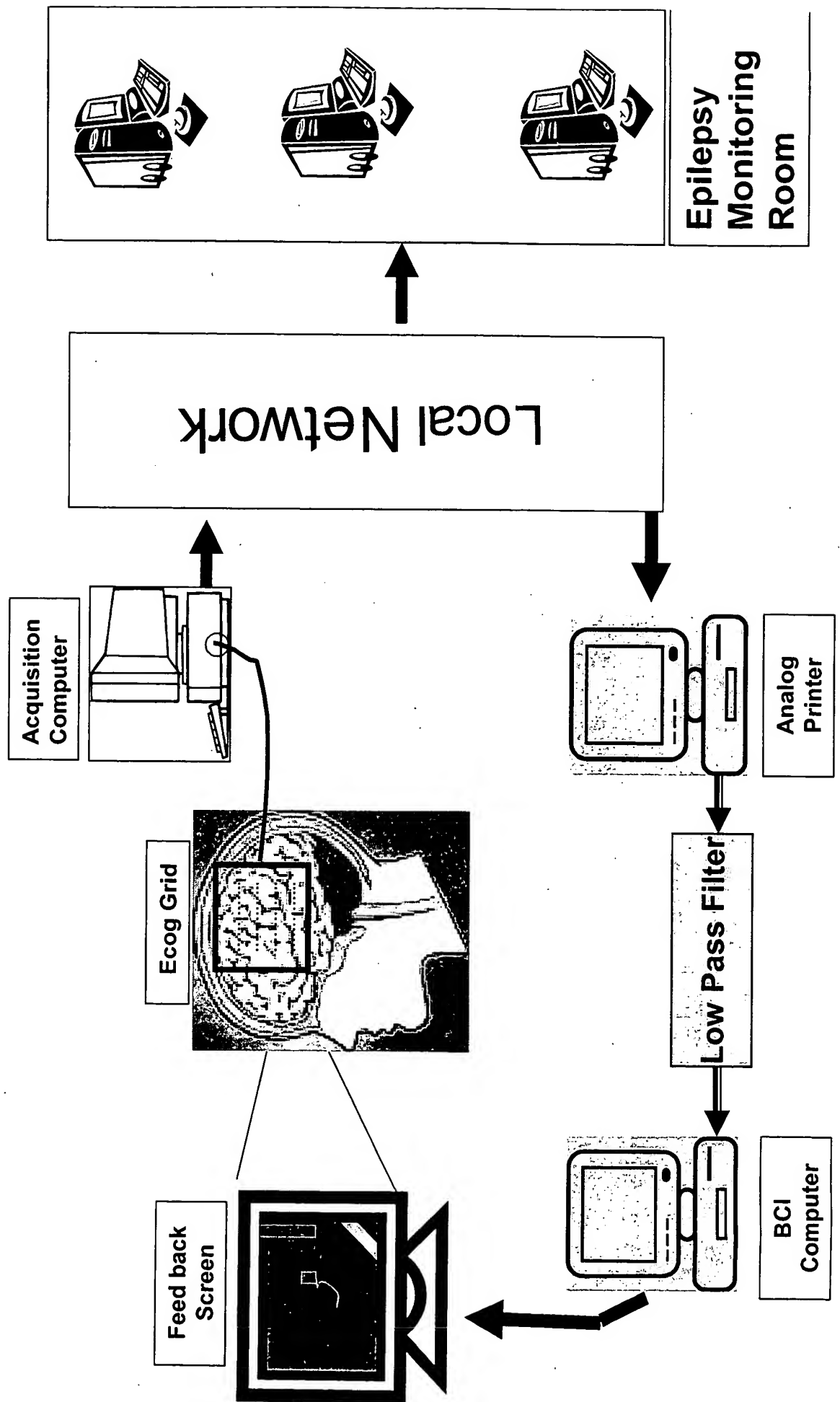


Figure 3b. ECOG BCI system

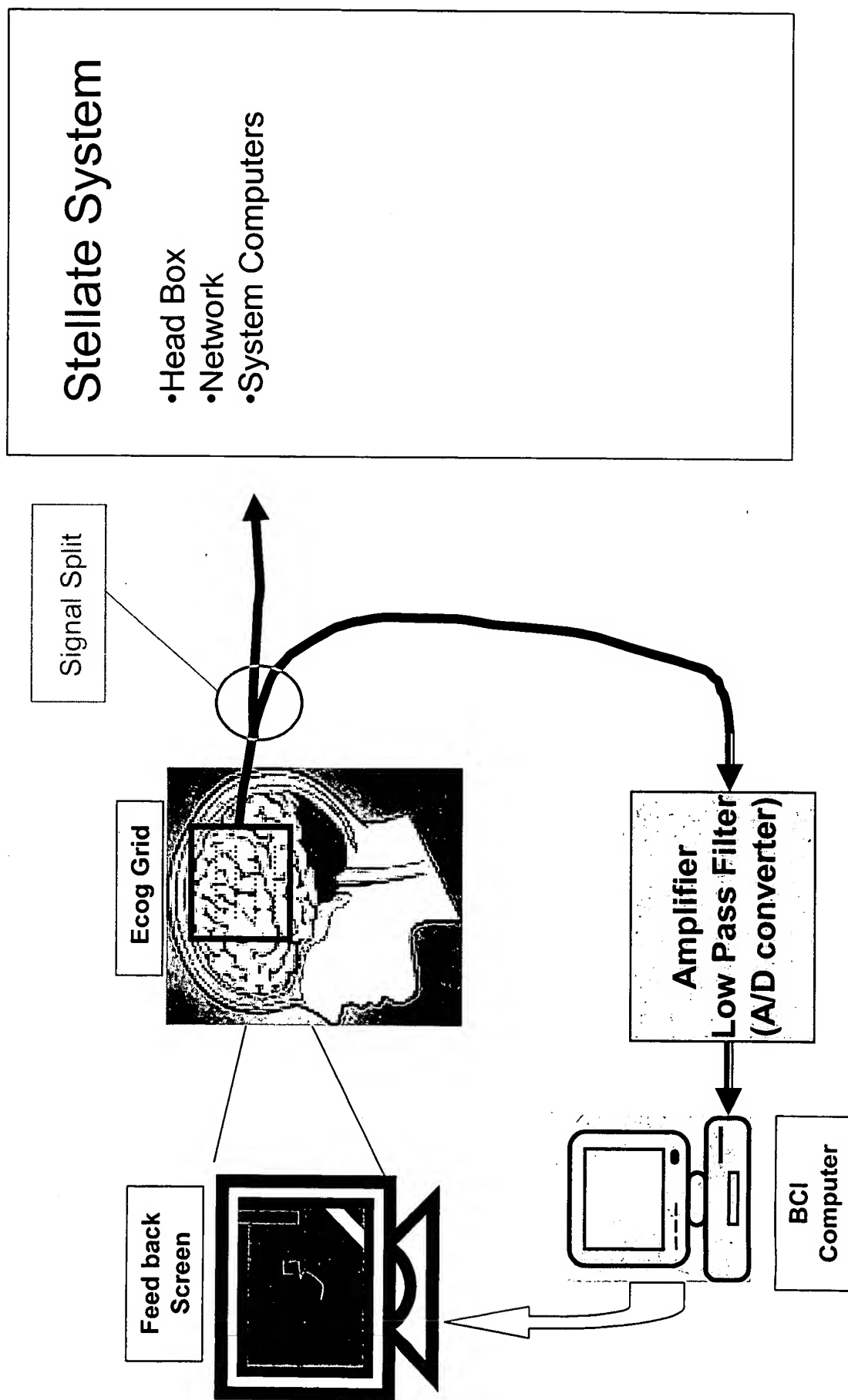


Figure 4



Figure 5

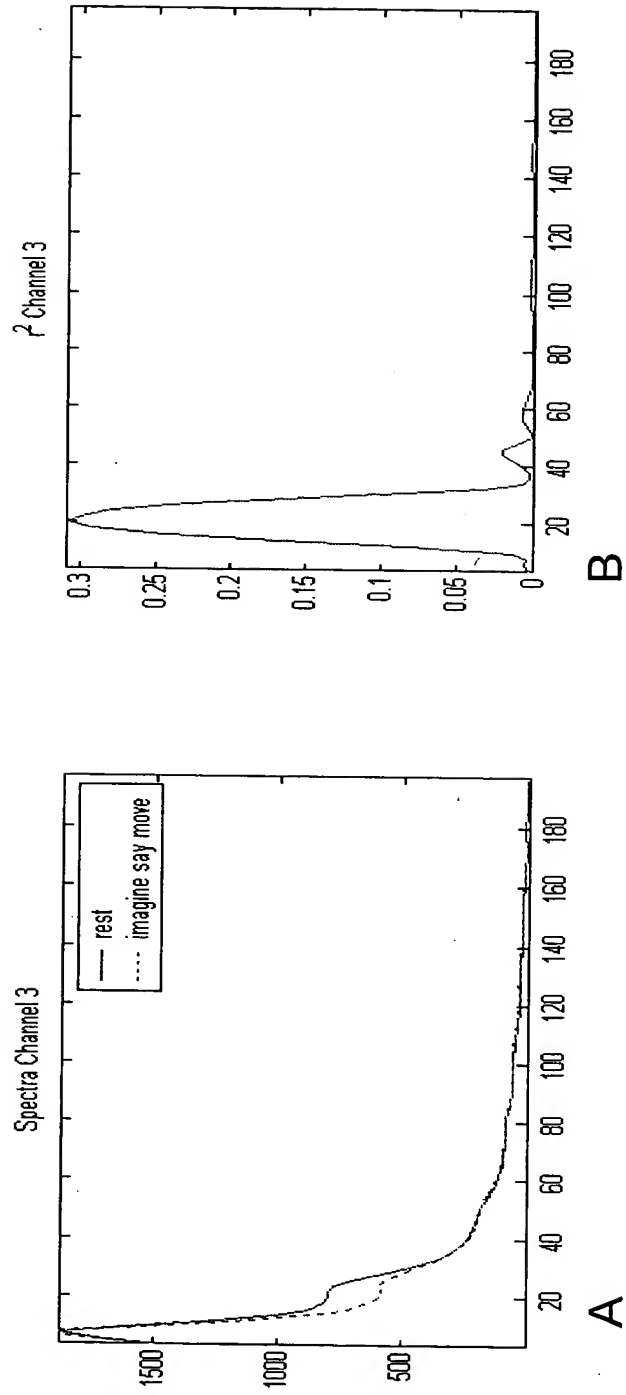
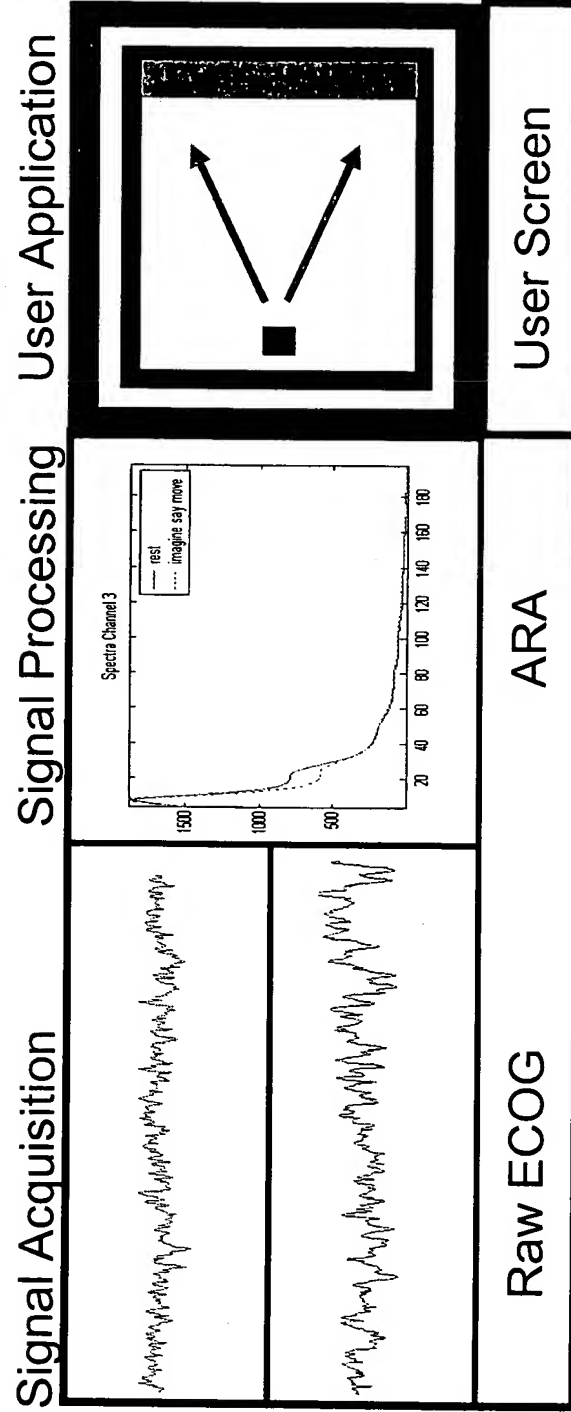


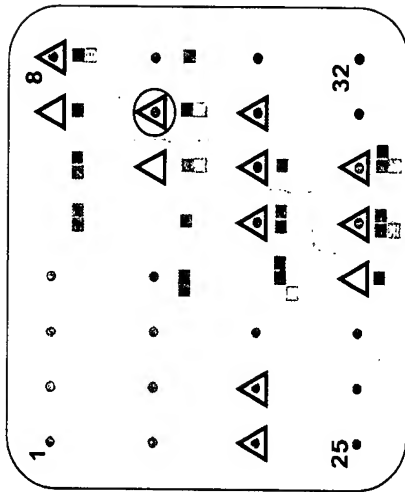
Figure 6



Condition 1. Imagine Saying Move, directs cursor upwards
 Condition 2. Rest, directs cursor downward

Figure 7

BB



Stimulation:

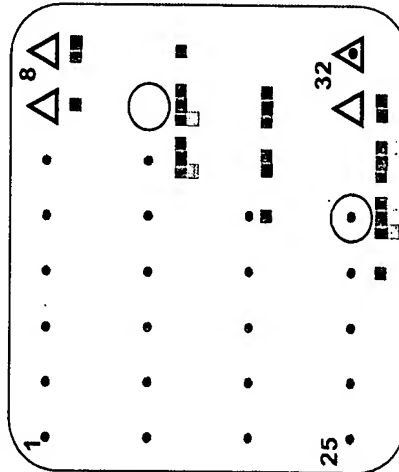
- 7,8: thumb twitching
- 14,15: jaw twitching
- 21,22,23,28,29, 30: tongue retraction
- 17,18 Speech Arrest



Closed Loop Electrodes:

- 15: Imagine open & closing right hand

DD*



Stimulation:

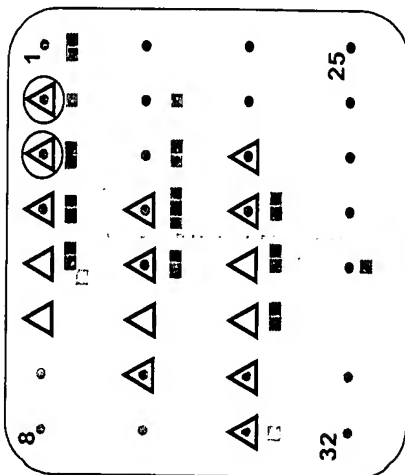
- 7,8: right facial twitching
- 31,31: jaw twitching



Closed Loop Electrodes:

- 15,29: Say the word "move" & imagine saying the word "move"
- 29: Tongue protrusion & imagined tongue protrusion

AA



Stimulation:

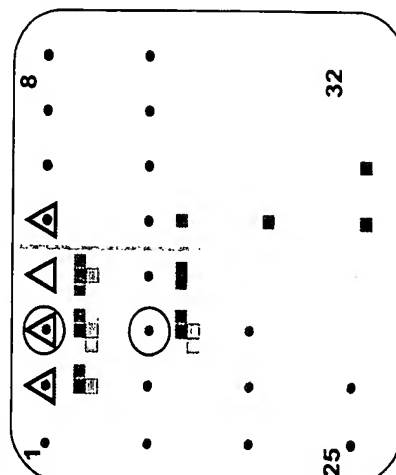
- 2,3: right thumb tingling
- 4,5,6, 12, 13: facial twitching and tongue retraction
- 19,20, 21: tongue retraction
- 14, 15: forearm supination
- 22,23,24: speech arrest



Closed Loop Electrodes:

- 2,3: Open & closing right hand

CC*



Stimulation:

- 2,3,4,5: tongue retraction



Closed Loop Electrodes:

- 3,11: Imagine saying the word "move"

Anatomic Electrode Position

- Temporal Lobe
- Parietal Lobe
- Prefrontal
- Premotor
- Sensorimotor
- Broca's Area

Trained Task Producing Activation

- Opening and closing right hand
- Imagine opening and closing right hand
- Protrude tongue
- Imagine protruding tongue
- Say the word "move"
- Imagine saying the word "move"

★ Patients with speech function localized to right hemisphere

----- Central Sulcus

Figure 8

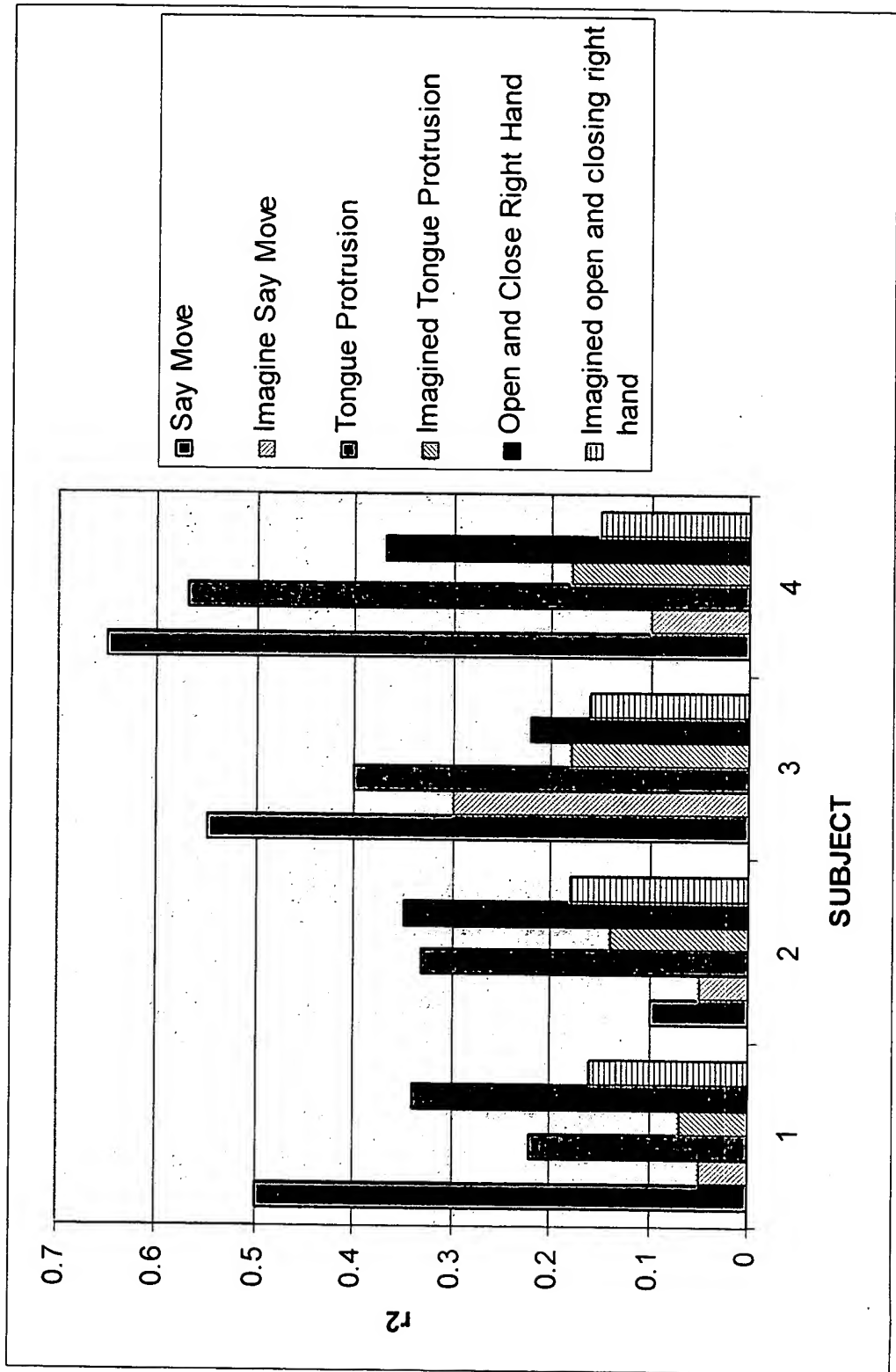


Figure 9

Prediction of Final Cursor Position

Patient	Self		# trials	1st half->2nd half		interlaced	
	$r^2(x)$	$r^2(y)$		$r^2(x)$	$r^2(y)$	$r^2(x)$	$r^2(y)$
Patient DD: 4 targets	0.61	0.57	556	0.45	0.45	0.54	0.49
Patient DD: 8 targets	0.65	0.26	924	0.50	0.06	0.59	0.10
Patient BB: 4 targets	0.47	0.45	326	0.02	0.14	0.13	0.11

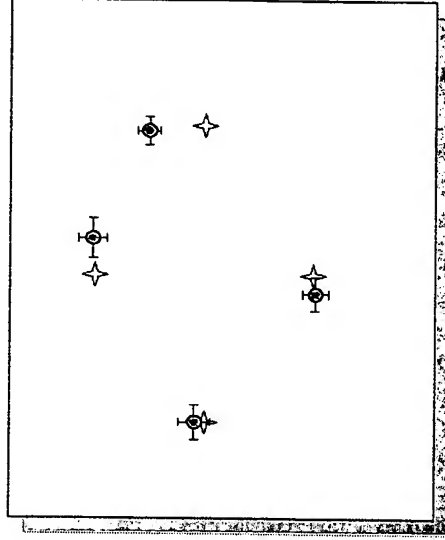


Figure 10

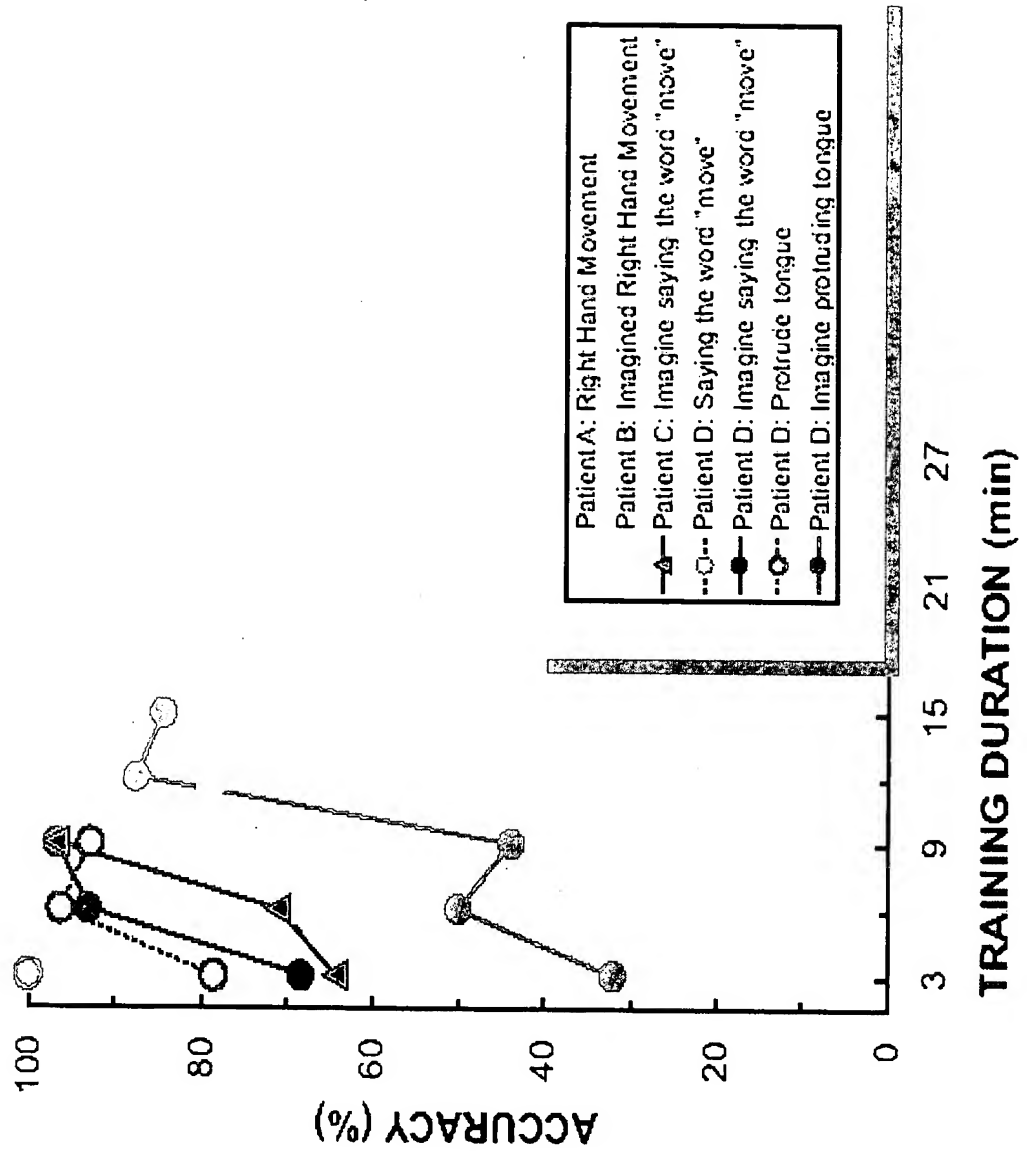
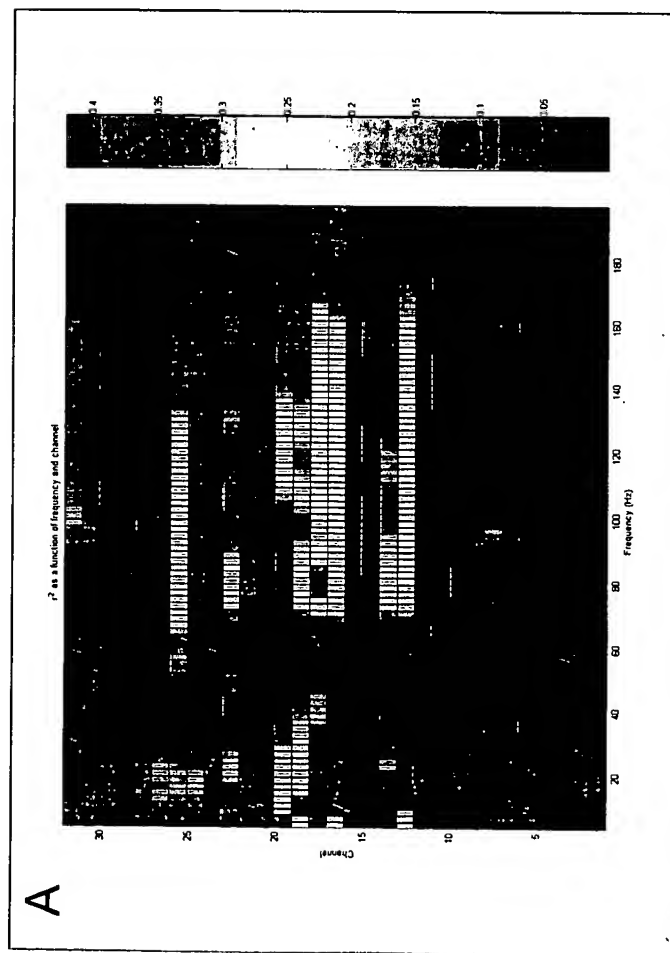
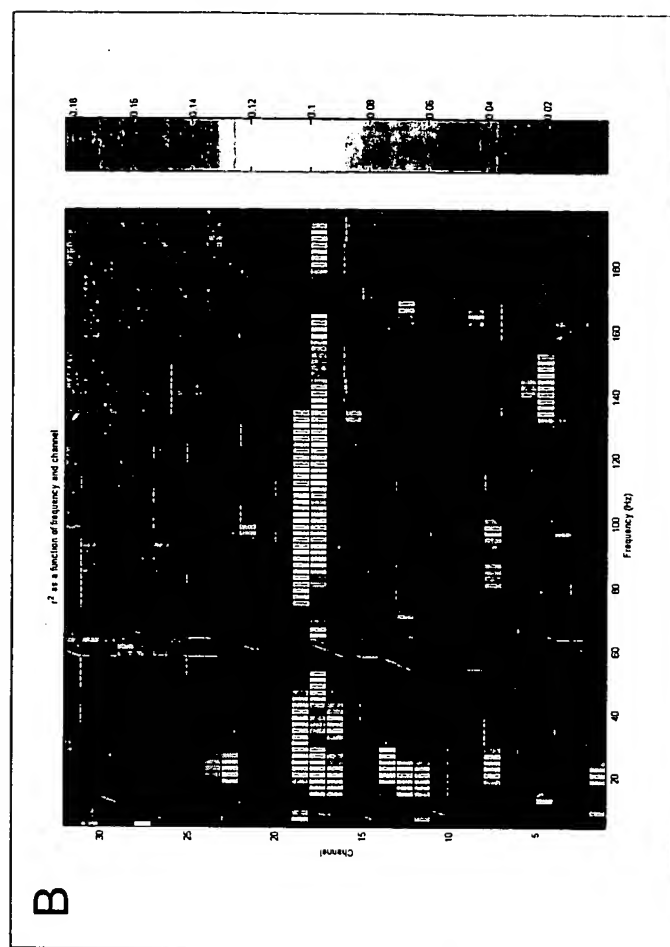


Figure 11



Middle Finger



Thumb

Figure 12: Analysis of Motor Speech

